Consumer Testing

HD Radio System Testing at Increased Power Levels[1]

Report prepared for iBiquity Digital Corporation by:

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Executive Summary

This study assessed the impact on consumers of increasing the digital power level for iBiquity Digital Corporation's FM HD Radio™ broadcasts from -20dBc to -10dBc on the analog listening experience for consumers. Specifically, iBiquity was interested in exploring whether increasing digital power on one channel would result in harmful interference to existing analog operations of first adjacent channel stations, and if so, under what transmission scenarios.

The study was conducted in two phases. The first phase, conducted from January to March, 2007 by iBiquity Digital Corporation, involved recording hours of audio from stations broadcasting at either -10 or -20 dBc IBOC power ratio at the protected contour (+6dB D/U) and past the protected contour (+0dB D/U). Audio was recorded from four interference scenarios: a Class B interferer measured against a Class B desired signal; a Class B Interferer measured in a short-spaced situation against a Class B desired signal, a "Super B" interferer measured against a Class "Super B" desired signal, and a "Super B" interferer measured against a Class B desired signal.

Recordings were sent to Salisbury University, where, during the second phase in April and May, a formal subjective evaluation of the audio was conducted. Results from subjective testing indicated that:

1. In the majority of conditions, participants listening on 1st adjacent channel analog stations did not report hearing differences when digital power was increased from -20dBc and -10dBc on the main channel.
2. At the protected contour (+6dB D/U) in the short spaced station scenario, listeners rated audio lower at -10dBc than at -20dBc. Thus, it is possible that the increase in adjacent channel digital power may potentially impact the analog broadcast.
3. Likewise, past the protected contour (+0dB D/U) in the Super B to B scenario, listeners rated audio lower at -10dBc than at -20dBc signaling a potential impact on the analog broadcast.
4. The MOS and Turn-off rates were correlated at 0.72, showing that quality ratings are a moderately good indicator of consumer loyalty. Additional factors, such as program material, motivation to listen and entertainment choices factor into consumers' decision making.
5. Speech is the genre most likely to show differences between -10 and -20dBc.

1 Introduction

This research study assessed the impact of increasing the digital power level for iBiquity Digital Corporation's FM HD Radio™ broadcasts on the analog listening experience for consumers. Currently, FM HD Radio broadcasters limit the total power of the digital sidebands to 20 dB below the power level of the station's analog carrier. However, broadcasters are interested in increasing digital power to extend digital coverage and adequately penetrate structures so that digital signals can be received. This research examined the feasibility of increasing the digital power level by 10 dB from a level of -20 dBc (relative to the analog carrier) to -10 dBc. The main focus of interest was exploring whether increasing digital power on one channel would result in harmful interference to existing analog operations of first adjacent channel stations, and if so, under what circumstances. Due to a historical legacy, in many cases the distribution of FM stations fails to satisfy the geographic spacing requirements of today's FCC's rules. Thus, conforming and non-conforming transmission scenarios were studied.

The study was conducted in two phases. The first phase, conducted during January, 2007 by iBiquity Digital Corporation, involved recording hours of audio on consecutive days from select radio stations broadcasting in either -10 or -20 dBc. These recordings were sent to Salisbury University where, during the second phase, a formal subjective evaluation of the audio was conducted. Subjective testing was conducted in Salisbury, Maryland between April and June, 2007.

2 Test Methodology

2.1 Field Test Program-Collecting Audio Material

The field work component of the test program included identifying appropriate FM stations and modifying the digital facilities of those stations to support the higher digital power levels required for the test. Two sets of audio samples were recorded at different times. First, analog audio samples were recorded from first adjacent FM stations with the host station broadcasting digitally using existing power levels of -20 dB**.** Second, analog samples from the first adjacent station were recorded at the higher host digital power levels of -10 dB. Depending on the station, either identical or similar audio content was broadcast on the analog station while the digital station operated at the two digital power levels. Audio was recorded in vans at both the protected contour (approximately +6 db D/U) and outside the protected contour (approximately 0 dB D/U). For a complete description of the field test program, please see iBiquity's "Field test procedures documentation".

In order to explore the implications of this proposed power increase, it was necessary to examine a variety of station configurations commonly found in today's radio landscape. Therefore, audio was recorded from four interference scenarios. In the first test scenario, a Class B interferer was measured against a Class B desired signal. In the second scenario, the impact of a Class B Interferer was measured in a short-spaced situation against a Class B desired signal. The "short-spaced" refers to the situation where the appropriate geographic separation is not maintained and the coverage areas of the adjacent channel stations may overlap or one station's coverage area may be within the coverage area of another station. In the third scenario, a "Super B" interferer was measured against a Class “Super B” desired signal. Finally, in the fourth scenario a “Super B” interferer was measured against a Class B desired signal. Table 2.1 lists the conditions recorded for use in subjective testing:

Table 2.1: Conditions used in subjective testing

Condition	Host Station	1st Adjacent Station
“B” to “B”	WKCI	WWBB and WCBS
“B” to “B” Short Spaced	WCSX	WXKR
“Super B” to “B”	KOST	KSCF
“Super B” to “Super B”	KOST	KVYB

In each condition, audio recordings were made over six commercially available radio receivers representing typical market segments. Table 2.2 lists the receivers used.

Table 2.2: Receivers used for subjective testing

Receiver	Description	Representing Market Segment
Bose	AWR1B2	Table top
Delphi	28061577	Automobile OEM
JVC	KD-HDR1	HD Receiver in analog
Onkyo	TX-SR504	Home
Pioneer	DEH-1800	Automobile
Tivoli	Model 2	Table top

2.3 Preparation of Audio Samples for Consumer Test

All audio streams collected in the field were parsed and edited at Salisbury University into individual 10-15 second samples. Audio streams included music, talk radio and commercials. Recorded music was diverse, coming from a variety of genres (e.g., rock, pop, country, hip-hop, etc.). While the program format was different between stations, within a station’s format, program material was uniform. For example, a station that played “hip-hop” for one DU and IBOC power ratio scenario played “hip-hop” for the other DU and IBOC power ratio scenario. Because the audio material was recorded at different times and at two power levels, the audio selections were not always identical[2]. Nevertheless, audio was matched closely in order to obtain a fair comparison between analog signals when the digital power was at -10 or -20 dBc.

The process of selecting music and speech samples was slightly different. With regard to music, all audio streams were characterized by 3 levels of density – light, medium and heavy. Samples were then selected from the -20 dBc audio stream and matched to selections from the -10 dBc audio stream that had the same characteristics. For example, a music selection recorded at -10 dBc may have included one male singer with several guitars in the background. This would have been classified as “light”. In order to compare this recording another musical selection featuring a solo male singer would be found that was recorded at -20 dBc.

[2] WCBS and WWBB played identical music during two hours of field collection; all other stations broadcast unique program material.

Selecting speech and voice-over samples was more straightforward. Speech was classified as “male” or “female”. Speech did not include any background material, music or other artifacts. Speech samples at -10 dBc and -20 dBc were matched according to the gender of the talker. Voiceovers were also classified as “male” or “female”, and always included background music and/or sound effects. Voiceovers were matched on both the gender of the talker and the density of music or sound effects in the background. For speech samples, special attention was given to finding samples that were non-offensive to listeners, yet interesting enough to hold their interest. Therefore, material referencing political, violent, biased or otherwise potentially controversial subjects was excluded.

Because recordings were taken in the field where the D/U bounced from -5 dB to 14 dB, it was critical to select recordings that were matched in ratio. Early in the test program it was decided that audio characterized at a +6 dB D/U must be taken from a segment where the signal was being received between +3 and +7 dB D/U. Similarly, audio was characterized as +0 dB D/U if the signal was received between -3 and +2 dB D/U.

Samples were parsed, edited and leveled for the subjective test. Enveloping was done at the beginning and end of the wave file so that no noise preceded or followed the desired music or speech sample. Elimination of noise at the beginning and end of all sound samples was crucial because any noise that was present could serve as a cue that could alter opinion scores. Leveling was done carefully so that all sound samples were equivalently loud. This is critically important in audio testing as consumers mistake “loudness” for “goodness”. As a rule, music and speech samples were considered “level” when they sounded equal in volume, as determined by Dr. Ellyn Sheffield.

3 Subjective Evaluation Program

Consumer satisfaction was measured in two ways. First, using an adapted version of the ITU-R recommended procedures for evaluating mid to large-sized differences, we obtained an overall quality measure for the presented audio samples. We then determined whether consumer listening behavior would likely change with increased digital power inserted onto the signal**.**

3.1 Participants

Forty-six female and forty-two male consumers were individually tested. Participants ranged in age from 18-70 years, and were recruited from both Salisbury University and the local community. Of the 88 consumers tested, 8 did not pass the screening test (see section 3.4 for screening details). Therefore only 80 participants were included in the final results (see Table 3.1 for a demographic breakdown of these listeners).

Table 3.1: Demographic breakdown of listeners whose data was included in final results

	Males	**Females**
18-29	**11**	**10**
30-39	**10**	**10**
40-49	**9**	**9**

50+	**10**	**11**

3.2 Test Environment

Testing took place in two sound-proof, acoustically treated listening booths at Salisbury University, located on the Eastern Shore of Maryland[3]. Booths were placed in a quiet room, free from environmental noise and distractions. Audio samples were presented to participants over Sennheiser HD-600 open dynamic professional stereo headphones. The samples for the experiment were stored on the hard drive of individual computers and were presented to listeners via software created specifically for audio testing. The experimenter was present in the room for the entire procedure.

3.3 Design and Procedures

In order to more fully understand the impact of increasing the digital power, it was necessary to test consumers on a very large number of listening conditions. Variables included 2 IBOC power ratios (-10 dBc and -20 dBc) x 4 field conditions ("B to B", "B to B short spaced, "Super B to B" and "Super B to Super B") x 6 receivers (Bose, Delphi, JVC, Onkyo, Pioneer, Tivoli) x 7 genres (Music light, Music Medium, Music Heavy, Female Speech, Male Speech, Female Voiceover and Male Voiceover). In a few cases, audio could not be obtained for one of the genres. Therefore, the listening matrix totaled 576 sound samples. Since this number represented too many samples for an individual listener to rate in a 2-hour time period, participants were divided into two groups of 40 listeners and randomly assigned to one of the two groups. Participants in group A listened to 276 samples, and participants in group B listened to the 300 other samples. Every 30 minutes of testing, they received a 5-10 minute rest break. Additionally, testing was self-paced and participants were encouraged to rest and relax at any time between trials if they felt bored or fatigued.

Listeners participated in a short screening test prior to the main test. The initial screening test ensured that participants were reliably able to distinguish between samples that differed in quality. The order of the audio sample presentation in the main test was randomized; therefore, each listener received a different sample presentation order.

3.4 Screening

There were 6 screening trials. For each trial, participants were asked to listen to 3 samples, 2 of which were the same and the 3rd different (for example, 2 female speech source samples and the same female speech sample processed through an AM receiver; 2 rock source samples from a CD and the third sample coded at HDC 24 kbps). The listener's task was to decide which of two "test" samples ("A" or "B") was different from the reference sample. In each trial, the first sample they heard was the "reference" sample. They then listened to the "A" and "B" samples and judged which of the samples was different from the reference. Listeners were free to replay any or all of the three samples until they were ready to respond and proceed to the next trial. In

[3] Booths supplied by iBiquity Digital Corporation were used in prior NRSC headphone testing

order to pass the screening test, participants had to answer 5 of the 6 trials correctly. Listeners were provided no feedback on the “correctness” of their responses during the screening test nor were they informed of their specific performance after they were finished.

3.5 Main Test

Following the screening, listeners participated in an absolute category, single-stimulus mean opinion score test (ACR-MOS). In ACR testing participants judged sound samples on an individual basis, using an implicit reference to judge the quality of the sound sample. Their mission was to give a statement of “overall quality” and rate each sample on its own merit using a modified ACR- scale. Participants could choose any of the following descriptions: Excellent; Good; Fair; Poor; Bad and Failure. Participants were told that Failure was a sample that had failed in audio quality and could not be listened to. Additionally, they reported whether they would continue to listen to the radio or turn it off, given the overall quality and noise that they heard on the sample. Appendix 1 is the Experimenter script used to explain the task to participants.

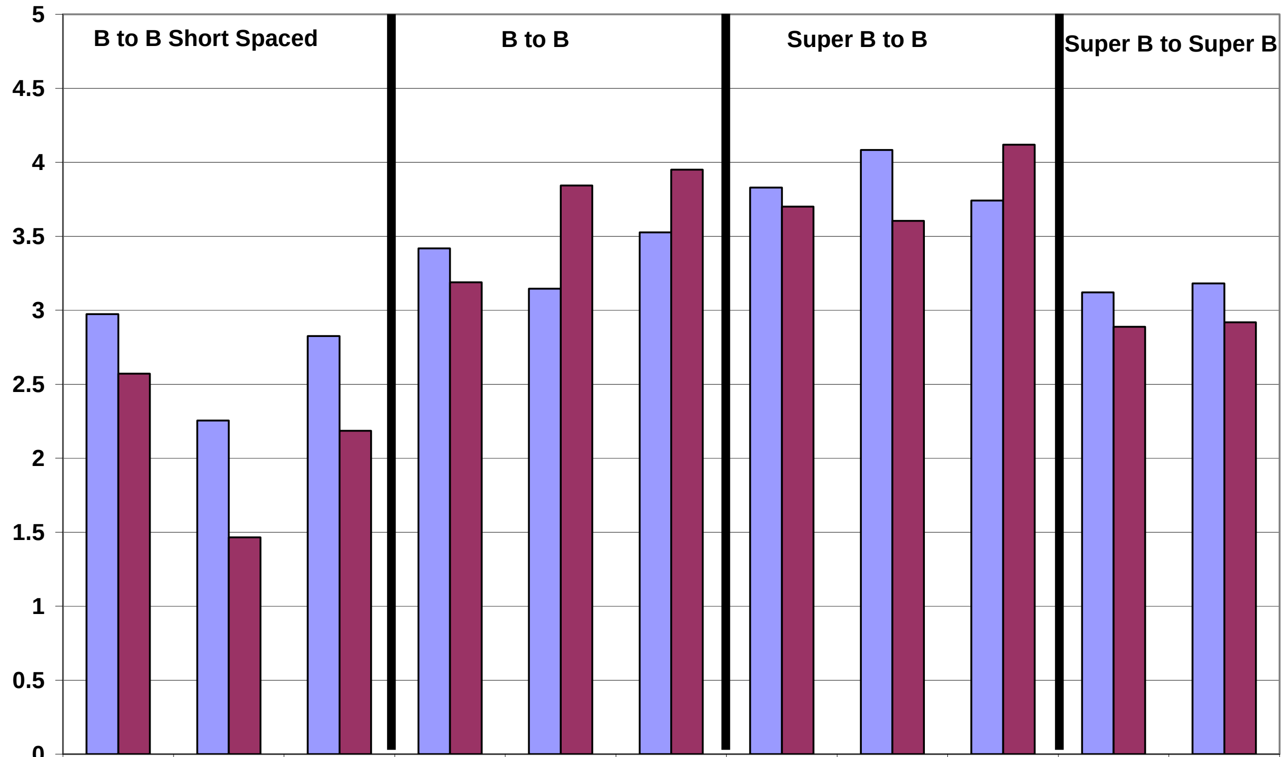
4 Results

Results indicate that raising the digital power ratio from -20 dBc to -10 dBc does not affect listeners’ opinions in most interference scenarios. However, there are scenarios that required further analysis, which will be examined in the following sections. It should be noted that, in general, when differences were heard, the -20 dBc ratio was preferred to -10 dBc. However, this was not uniformly the case, particularly for the Delphi receiver.

4.1 Results at the protected contour (+6 dB D/U)

Figure 4.1.1 shows the overall results from mean opinion score testing. As can be seen from this figure, participants rated -10 dBc and -20 dBc similarly in B to B, Super B to B and Super B to Super B. In B to B short spaced, participants rated music, speech and voiceover higher at -20 dBc. As would be expected, the largest difference is seen in speech, where background noise can be both heard most clearly and interferes most directly with intelligibility. From these results it can be predicted that in the majority of cases listeners of adjacent channel analog stations would not experience meaningful impact from the increase in digital power. In the case of the short spaced stations where the analog station broadcasts a speech or voiceover format, the increase in adjacent channel digital power may increase the potential impact on the analog broadcast. (See appendix 2 for MOS results by genre and appendix 3 for leave-on results by genre.)

Figure 4.1.1: All scenarios at D/U +6
MOS Scores

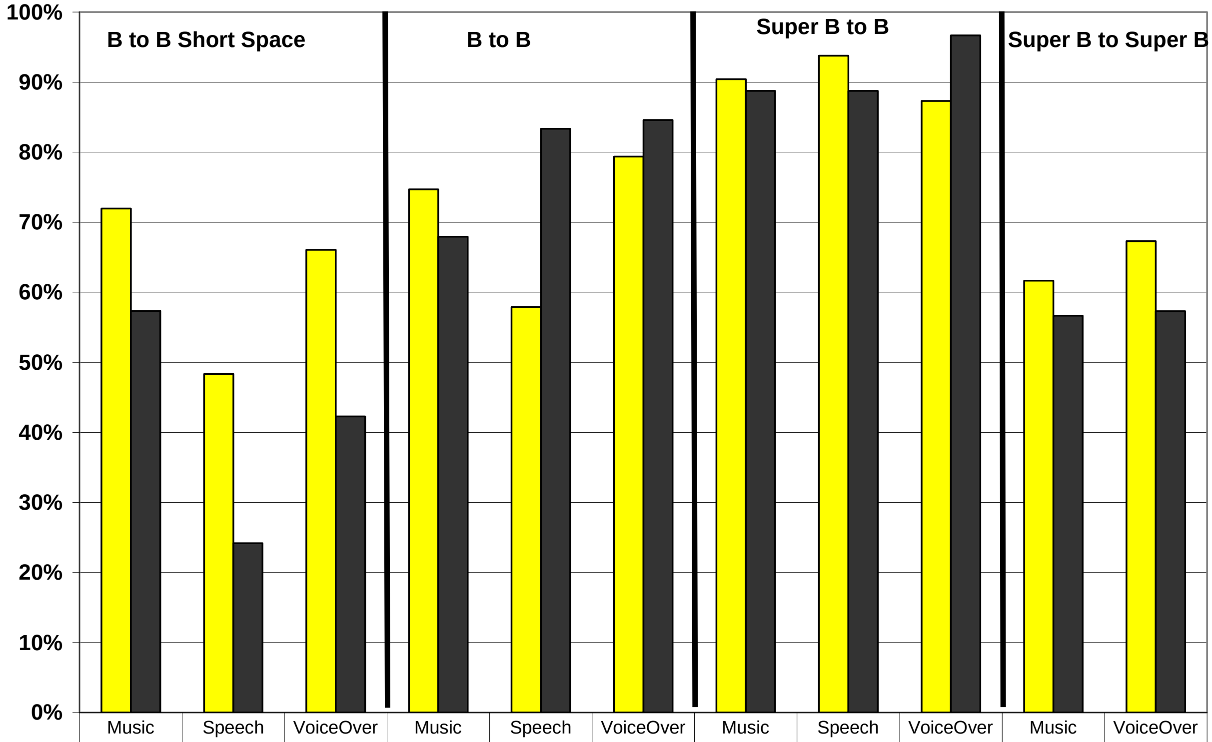


	Music	Speech	VoiceOver	Music	Speech	VoiceOver	Music	Speech	VoiceOver	Music	VoiceOver
-20	2.97	2.25	2.83	3.42	3.15	3.53	3.83	4.08	3.74	3.12	3.18
-10	2.57	1.46	2.19	3.19	3.84	3.95	3.70	3.60	4.12	2.89	2.92

In order to provide some greater clarity about the significance of any drop in MOS score, the test program also asked listeners to comment on whether or not they would continue listening to this broadcast.

Figure 4.2 shows the percentage of people who would continue listening to the program, given the audio quality. The patterns between MOS and participant listening percentages are highly correlated, as would be predicted. Notice that at an MOS level of 3.5 approximately 80% of all listeners say they would continue to listening. At an MOS of 3.0 the percentage drops to between 60% and 70%. Since listeners rarely use the extremes of the MOS scale (in this case 0 and 5) it is understandable that at an MOS of 4.1, 97% of listeners report that they would continue to listen to the broadcast. Taken together, figures 4.1 and 4.2 indicate that the B to B short spaced scenario presents the only situation where the increased digital power potentially increases the impact on analog operations.

Figure 4.1.2: All scenarios at D/U +6
Percentage of participants continuing to listen



	Music	Speech	VoiceOver	Music	Speech	VoiceOver	Music	Speech	VoiceOver	Music	VoiceOver
-20	0.72	0.48	0.66	0.75	0.58	0.79	0.90	0.94	0.87	0.62	0.67
-10	0.57	0.24	0.42	0.68	0.83	0.85	0.89	0.89	0.97	0.57	0.57

Figures 4.1.3, 4.1.4, and 4.1.5 show results for individual receivers by genre (speech, music and voiceover). Notice that participants are reporting the greatest differences with the Pioneer, Onkyo and JVC receivers in the speech genre.

Figure 4.1.3: +6 dB D/U: Music in all scenarios

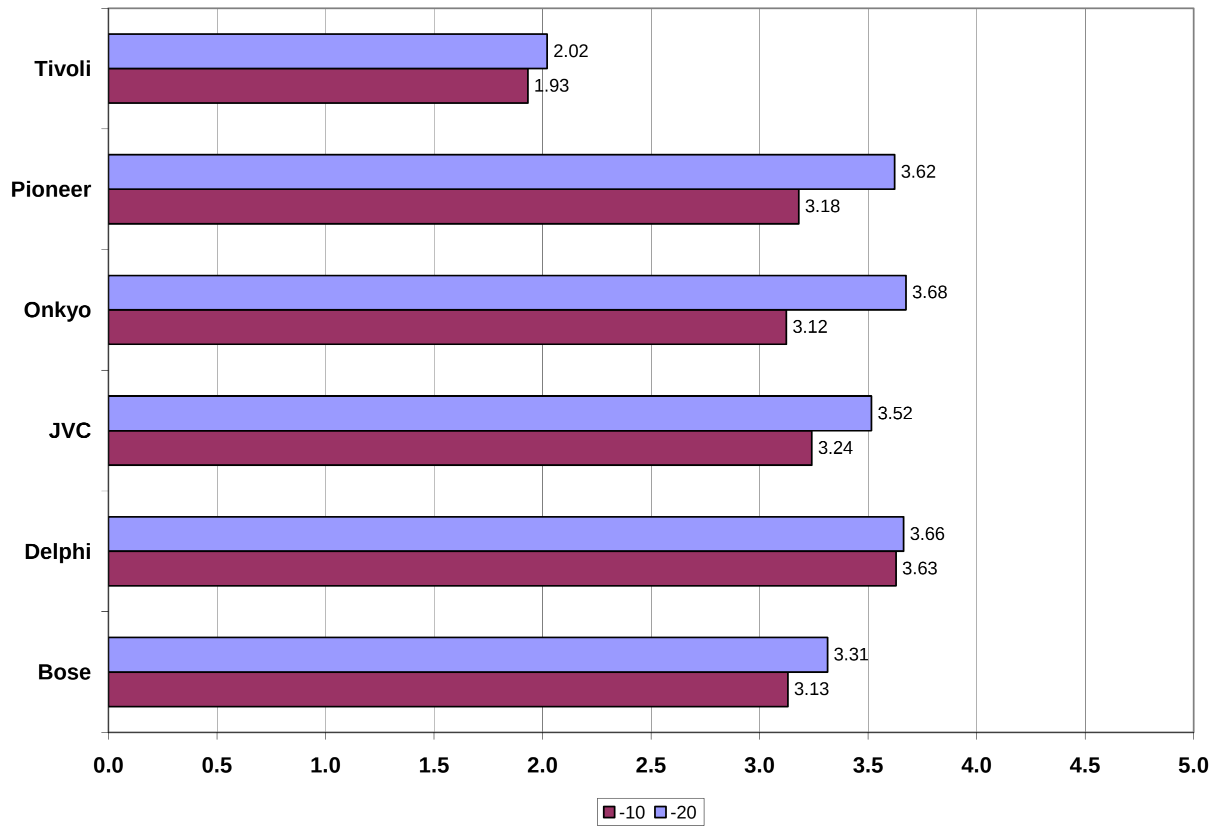


Figure 4.1.4: +6 dB D/U: Speech in all scenarios

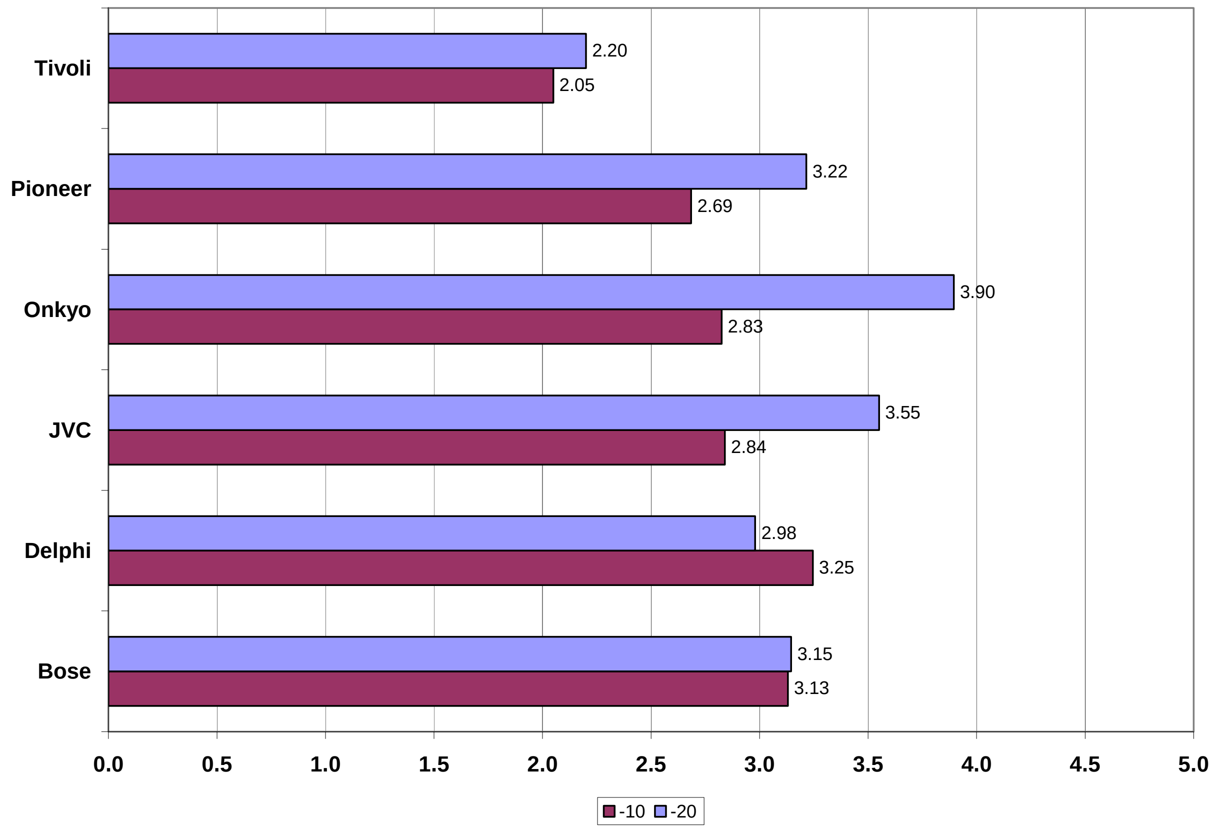
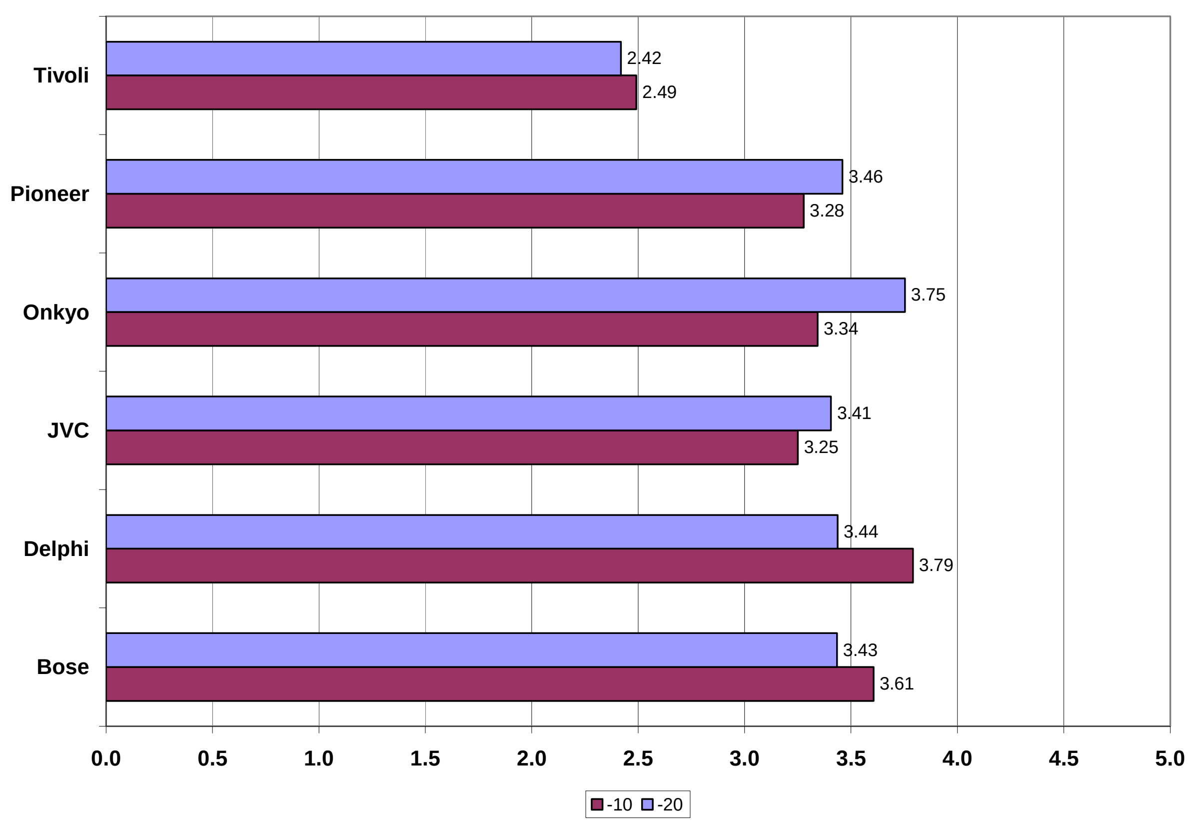


Figure 4.1.5: +6 dB D/U: Voiceovers in all scenarios



In order to examine the speech genre further in the B to B Short Spaced scenario, we parsed the data by individual receivers. Figure 4.1.6 shows MOS results and Figure 4.1.7 shows percentage of participants continuing to listen. As is evident from these figures, participants heard the greatest differences when listening to the Pioneer, Onkyo and JVC receivers.

Figure 4.1.6: +6 dB D/U: B to B Short Space (Speech)

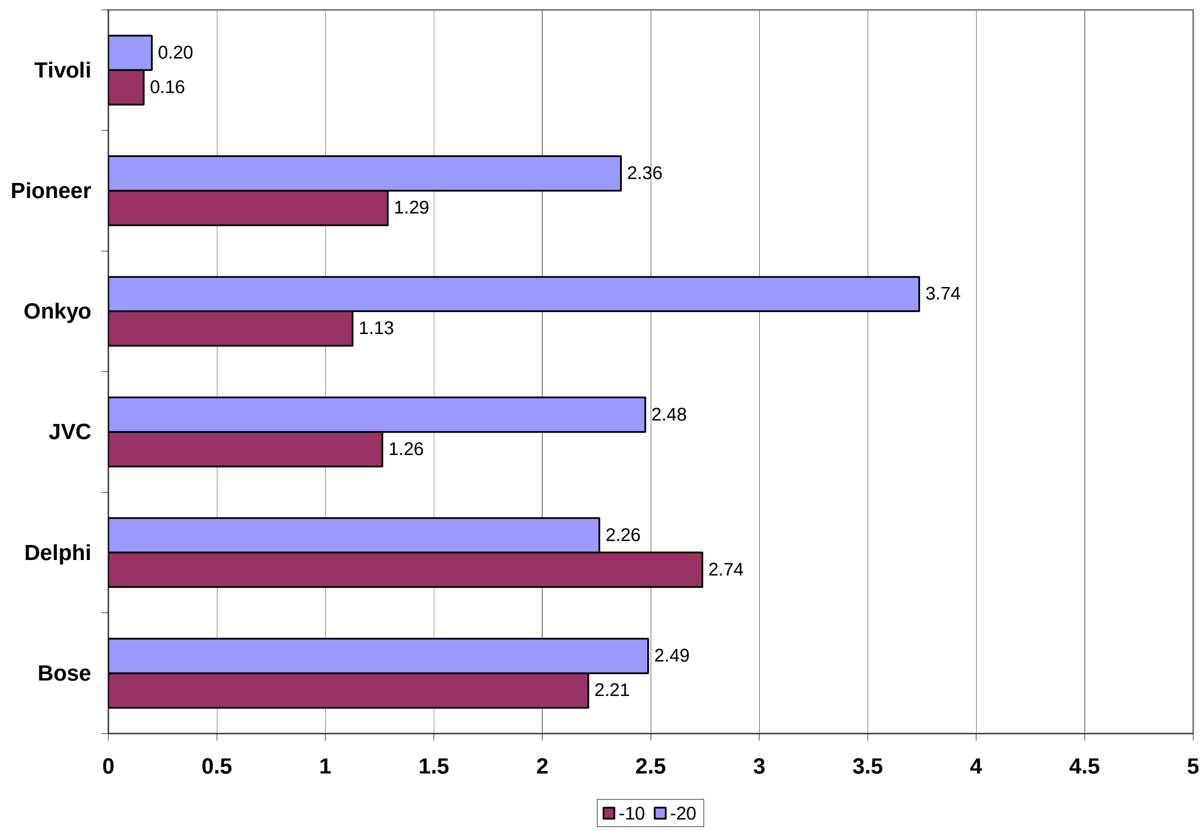
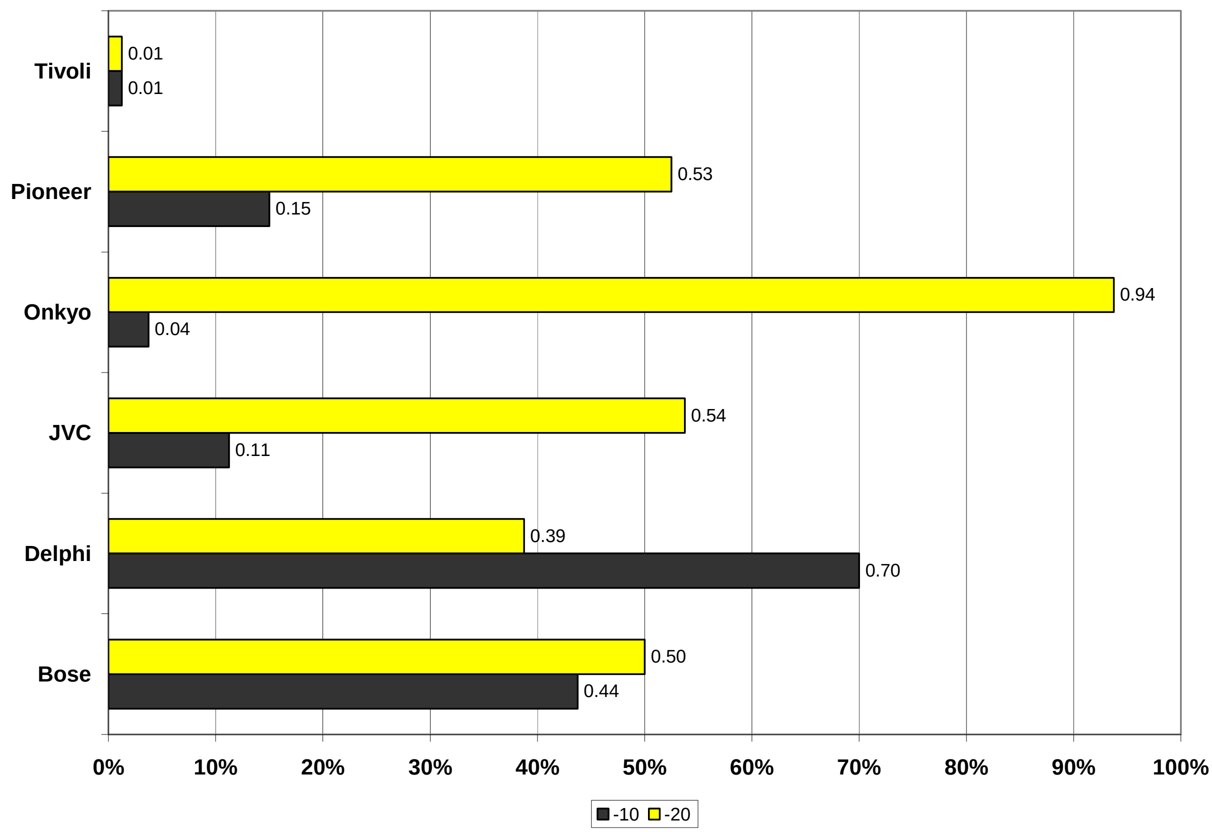


Figure 4.1.7: +6 dB D/U: B to B Short Space
Percentage of participants continuing to listen (Speech)

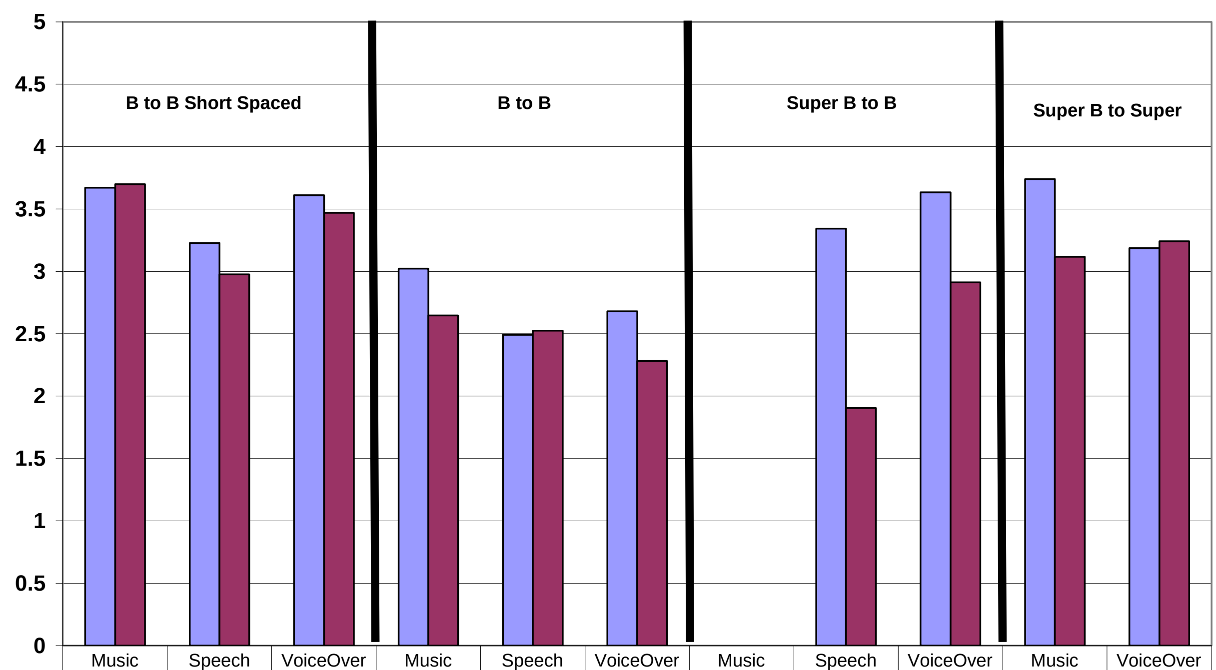


4.2 Results at D/U +0

Figure 4.2.1 shows the overall MOS results at +0 dB D/U, representing listening beyond the analog stations protected contour. In contrast to results found at +6 dB D/U, at +0 dB D/U participants rated -10 and -20 similarly in B to B short spaced. However, in Super B to B, participants rated speech and voiceover better at -20 than at -10. Due to the nature of the program material collected in the field for the Super B to B condition, there were no music samples to analyze. From these results it can be predicted that the only area with any potential increased impact on analog operations at +0 dB D/U is the Super B to B scenario.

Figure 4.2.1

All Scenarios: D/U +0

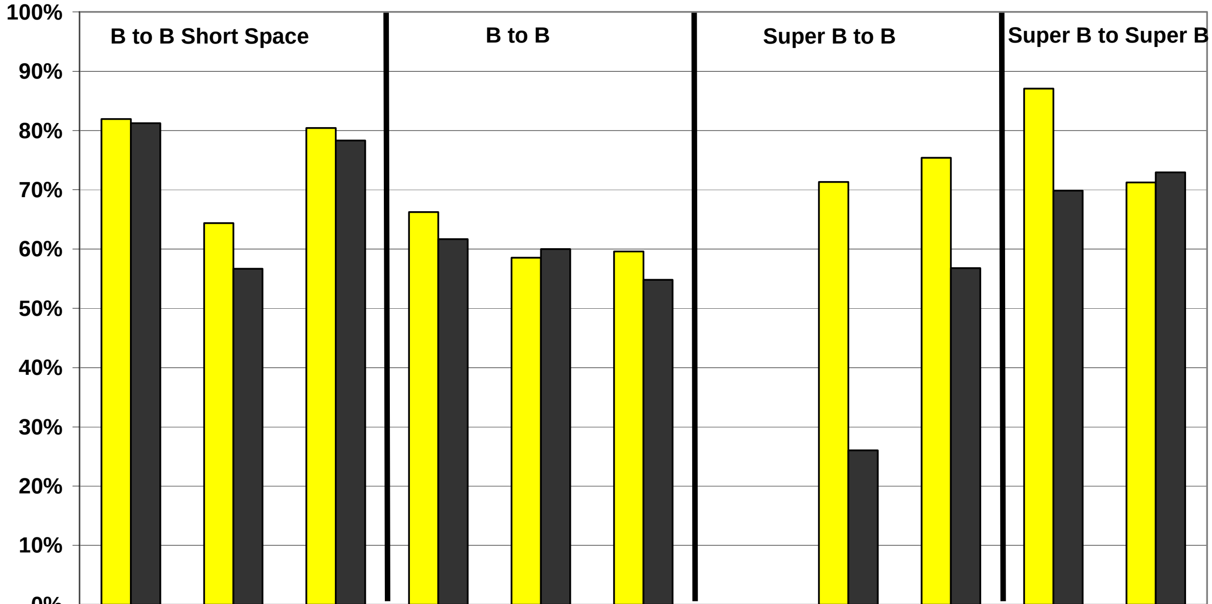


	Music	Speech	VoiceOver	Music	Speech	VoiceOver	Music	Speech	VoiceOver	Music	VoiceOver
-20	3.67	3.23	3.61	3.02	2.49	2.68		3.34	3.63	3.74	3.19
-10	3.70	2.98	3.47	2.65	2.53	2.28		1.90	2.91	3.12	3.24

Figure 4.2.2 shows the percentage of people who would continue listening to the program, given the audio quality. Again, the pattern between MOS and listening is highly correlated. The listening data reinforces the conclusion that the only potential impact on listeners would occur in the Super B to B scenario.

Figure 4.2.2

All Scenarios: D/U +0
Percentage of listeners continuing to listen



	Music	Speech	VoiceOver	Music	Speech	VoiceOver	Music	Speech	VoiceOver	Music	VoiceOver
-20	0.82	0.64	0.80	0.66	0.59	0.60		0.71	0.75	0.87	0.71
-10	0.81	0.57	0.78	0.62	0.60	0.55		0.26	0.57	0.70	0.73

Figures 4.2.3, 4.2.4, and 4.2.5 show results for individual receivers by genre (speech, music and voiceover). Notice that there are few meaningful differences between -20 dB and -10 dB, with the exception of the JVC, Delphi and Bose receivers in speech and voiceover.

Figure 4.2.3: +0 dB D/U: Music in all scenarios

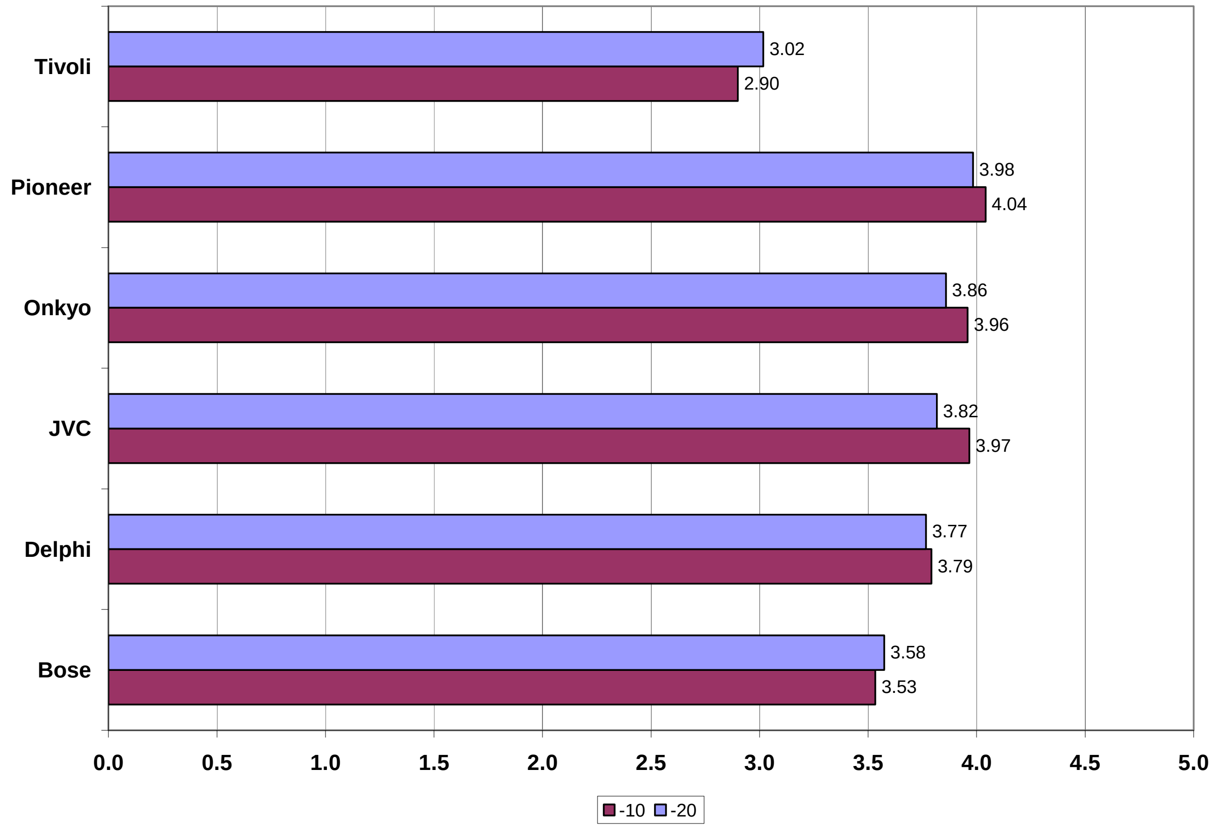


Figure 4.2.4: +0 dB D/U: Speech in all scenarios

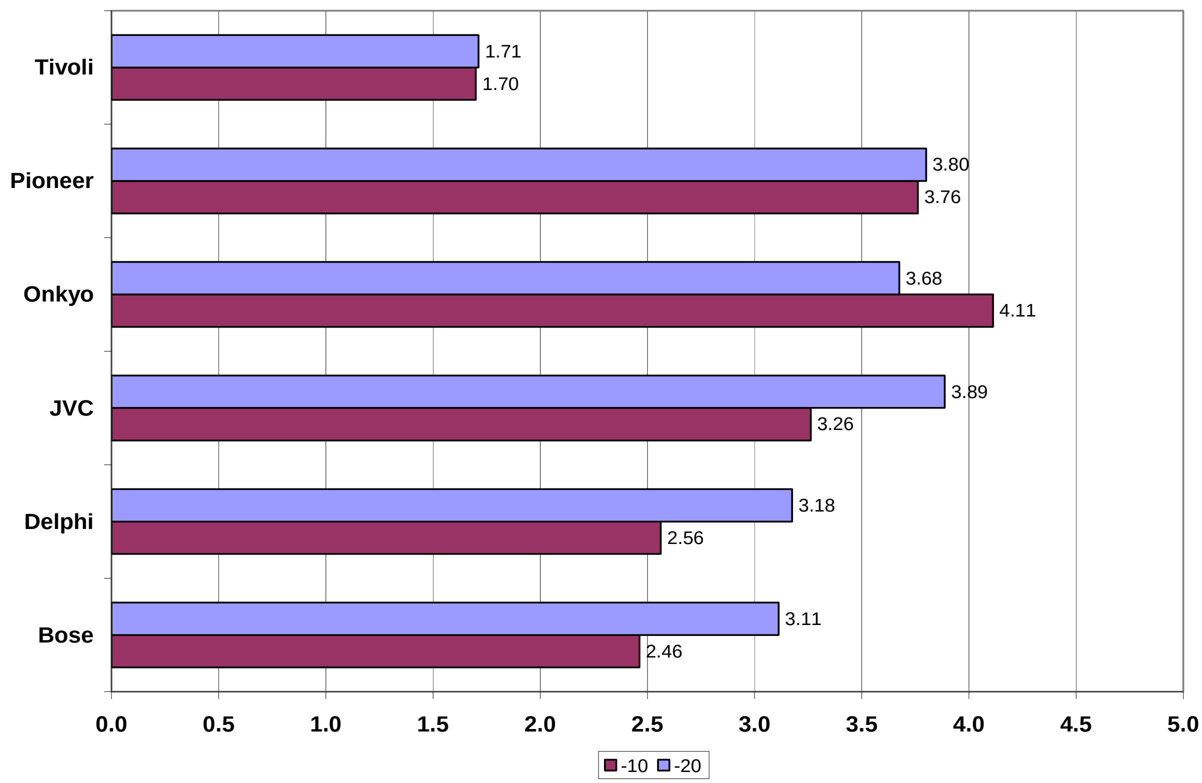
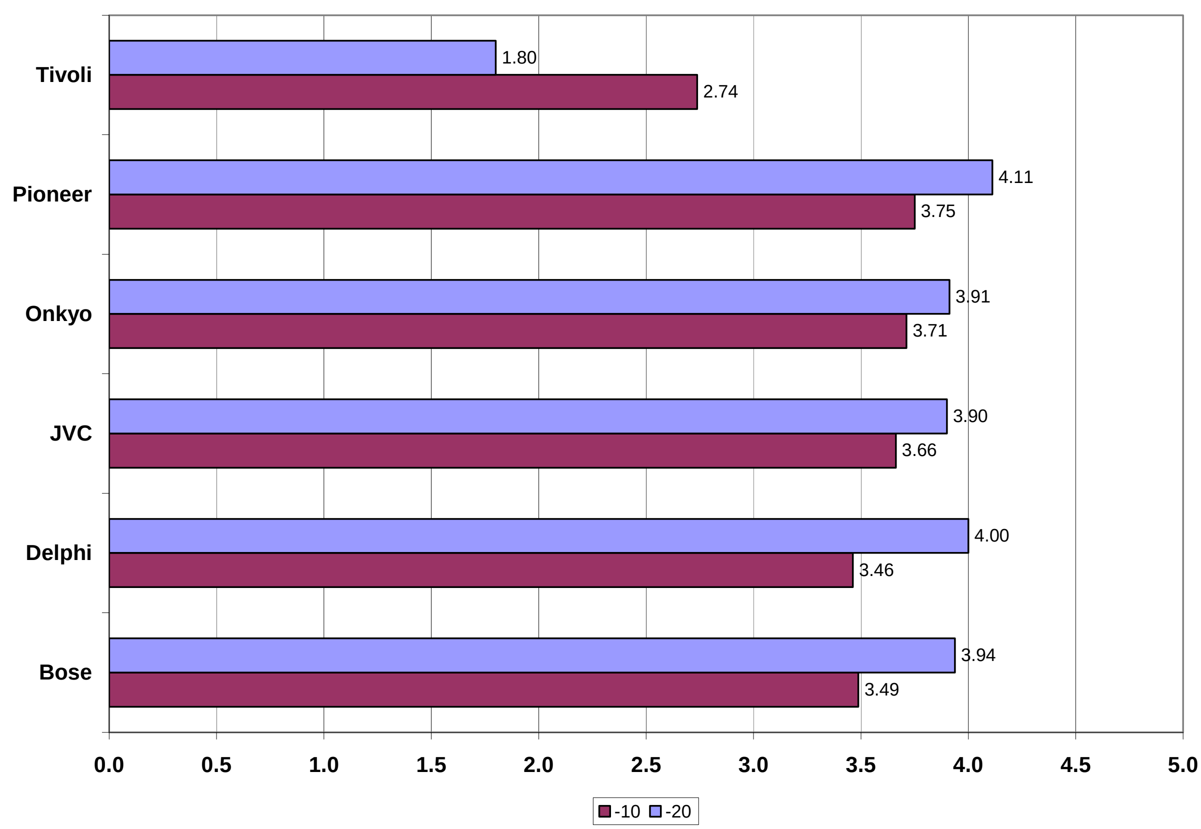


Figure 4.2.5: +0 dB D/U: Voiceover in all scenarios



Again, examining the speech genre further, Figure 4.2.6 shows MOS results by receivers and Figure 4.2.7 shows listener rates by receivers in the Super B to B condition. As is evident from these graphs only in this scenario participants rating -10 significantly lower than -20 for all receivers, and suggesting they would change their listening behavior if the digital power were increased.

Figure 4.2.6: +6 dB D/U: Super B to B (Speech)

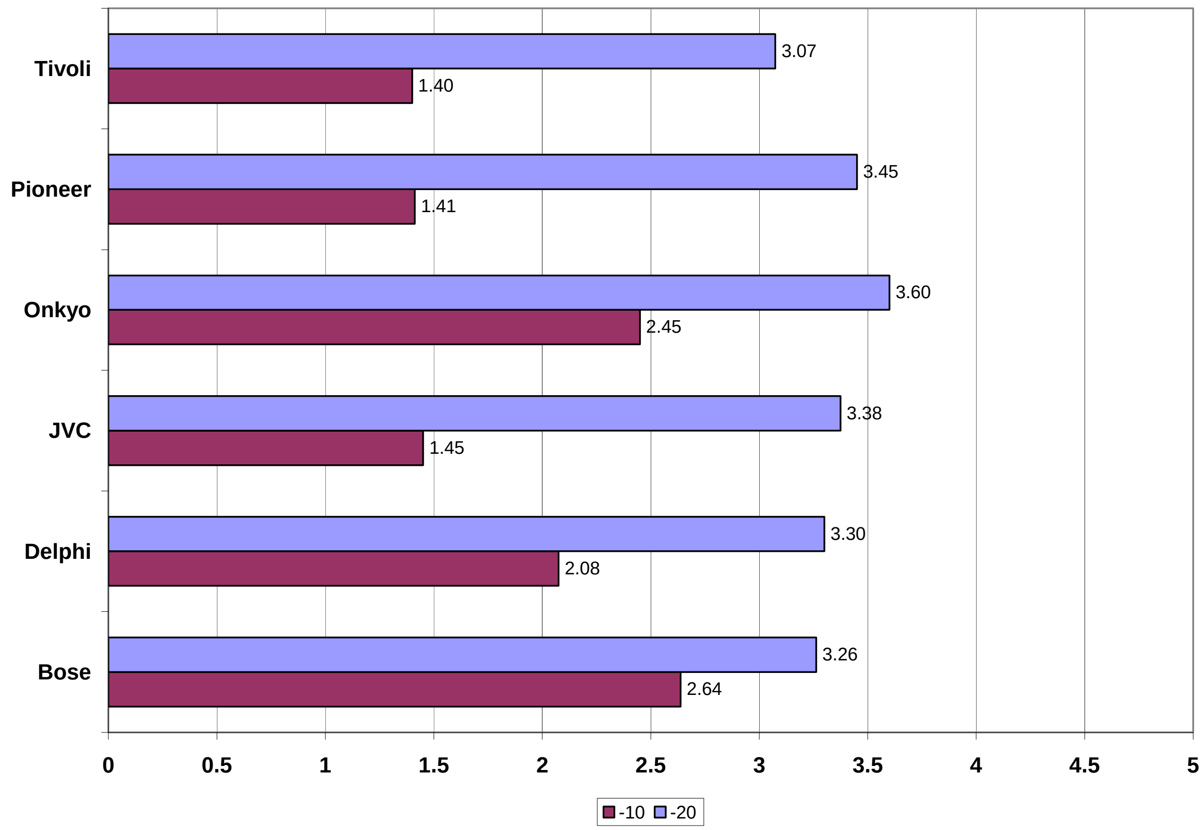
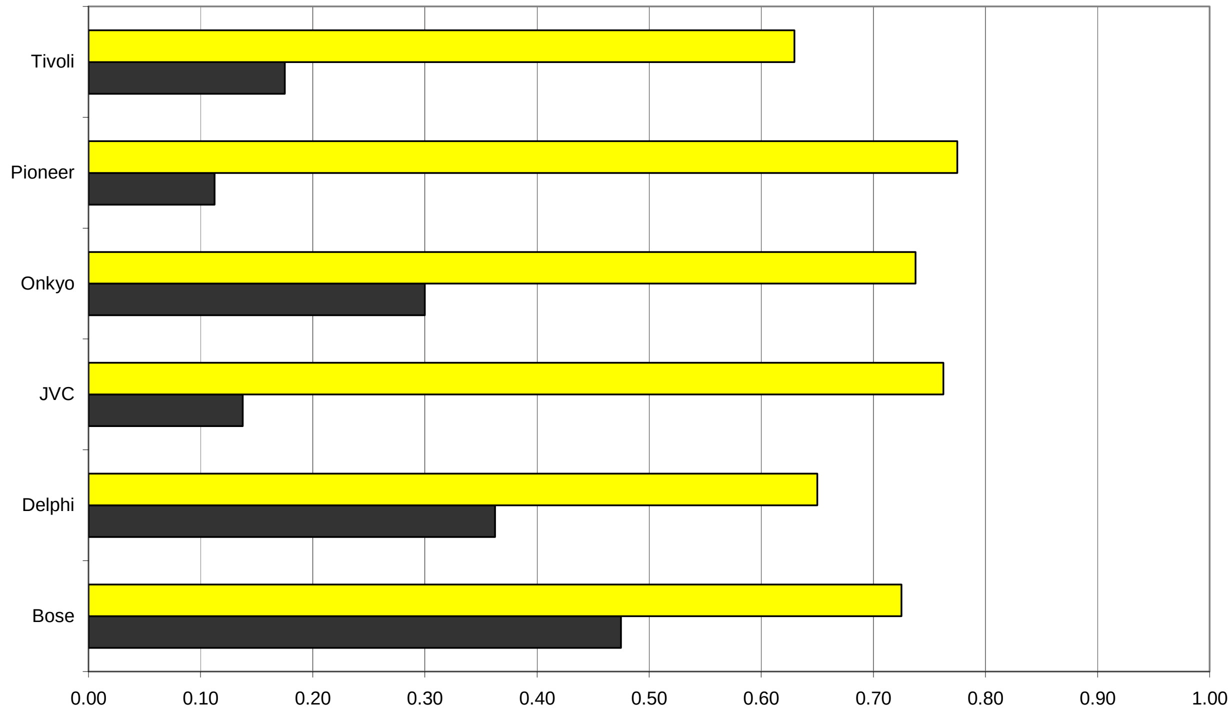


Figure 4.2.7: +6 dB D/U: Super B to B
Keep listening to radio (Speech)



	Bose	Delphi	JVC	Onkyo	Pioneer	Tivoli
-20	0.73	0.65	0.76	0.74	0.78	0.63
-10	0.48	0.36	0.14	0.30	0.11	0.18

Experimenter Script

(Experimenter – is the consent form signed??? You cannot proceed without a signed consent form!!!)

Experimenter – Read word for word. Do NOT improvise.

Welcome to our session. Today you will be participating in an audio test which should last approximately 2 hours. There are two parts to this test. In the first part of the test, you will hear a series of samples and compare them to a "reference". In this part you will play a Reference, an A and a B sample, and judge which of the samples is **different** from the reference. There will be six trials to judge.

In the second part you will first hear over 250 short samples. Please listen to the sample from start to finish. At the end of the clip you will be asked two questions about it. The test will be divided into short sessions. After each session, the computer will tell you to take a 5 minute break. That's your turn to go to the bathroom, have a drink of water, talk to me, or just relax. Once you start a session, you should continue until the program tells you to take a break, but you are also encouraged to take the test at your own pace. This may mean stopping between samples if you feel you need to "clear your head" for a few seconds.

For each session, you will be asked to rate the audio on a 6 point scale - Excellent, Good, Fair, Poor, Bad and Failure. Failure is just that – the sample has failed in audio quality and cannot be listened to. You will also be asked for each sample whether you would keep the radio on or turn it off, given what you just heard. In all cases, please understand that we are not asking you to judge the program material, or whether you like or dislike a particular segment. We know that you will have various feelings about the samples you are going to listen to. You will be hearing speech, commercials, and music and you may not like everything you hear. But for this test, we are asking you to try to keep focused on only one thing: the quality of the audio transmission you are listening to. That quality includes the way it sounds, background noise, etc. You may feel a little uncomfortable giving your opinion at first without a reference to guide you. Just pretend you're in your car listening to the radio and think about how you would want the radio to sound. That should give you a good guide. By the time you've rated a few samples, you'll feel like a pro!

Now we are going to begin the first part. Any questions so far?

Experimenter - set up the Listener in the SCREENING TEST – see below.

Remember: Headphones on – red/right ear.
Adjust volume during the first trial.
Make sure the listener knows how to use the software!

After the SCREENING test is done, set up the listener in the MAIN TEST 1. Adjust the volume during the first trial. When the listener is done go to MAIN TEST 2.

Appendix 2: MOS by scenario and genre

			+0		+6					+0		+6	
			-20	-10	-20	-10				-20	-10	-20	-10
B to B	Music	Bose	3.6	3.5	3.3	3.2	SuperB	Music	Bose			3.6	3.7
ShortSpace		Delphi	3.8	3.8	3.3	3.7	to Reg B		Delphi			3.9	4.0
		JVC	3.8	4.0	3.0	2.6			JVC			3.7	3.8
		Onkyo	3.9	4.0	3.8	2.3			Onkyo			4.1	3.5
		Pioneer	4.0	4.0	3.4	2.6			Pioneer			4.2	3.6
		Tivoli	3.0	2.9	1.2	1.0			Tivoli			3.6	3.6
	Speech	Bose	3.1	2.5	2.5	2.2		Speech	Bose	3.3	2.6	4.0	3.6
		Delphi	3.2	2.6	2.3	2.7			Delphi	3.3	2.1	3.9	3.6
		JVC	3.9	3.3	2.5	1.3			JVC	3.4	1.5	4.2	3.6
		Onkyo	3.7	4.1	3.7	1.1			Onkyo	3.6	2.5	4.0	3.7
		Pioneer	3.8	3.8	2.4	1.3			Pioneer	3.5	1.4	4.3	3.5
		Tivoli	1.7	1.7	0.2	0.2			Tivoli	3.1	1.4	4.2	3.5
	VoiceOver	Bose	3.9	3.5	3.4	3.3		VoiceOver	Bose	3.8	3.5	3.6	4.2
		Delphi	4.0	3.5	3.2	4.1			Delphi	3.1	3.2	3.7	4.2
		JVC	3.9	3.7	3.1	2.0			JVC	3.7	2.6	3.8	4.0
		Onkyo	3.9	3.7	3.7	1.5			Onkyo	4.0	3.4	3.7	4.2
		Pioneer	4.1	3.8	3.1	2.0			Pioneer	3.5	2.5	3.9	4.1
		Tivoli	1.8	2.7	0.5	0.3			Tivoli	3.8	2.3	3.7	4.1
B to B	Music	Bose	4.1	3.5	3.4	3.1	SuperB	Music	Bose	3.9	3.9	3.1	2.9
		Delphi	4.2	3.8	4.0	3.7	to SuperB		Delphi	4.0	3.8	3.1	3.1
		JVC	4.2	3.8	3.8	3.6			JVC	3.8	3.1	3.0	2.8
		Onkyo	1.1	0.6	3.7	3.5			Onkyo	3.3	2.1	3.2	2.9
		Pioneer	4.2	3.8	3.7	3.4			Pioneer	3.9	3.1	3.3	3.0
		Tivoli	0.4	0.4	1.9	1.9			Tivoli	3.5	2.7	2.9	2.7
	Speech	Bose	2.8	3.0	2.7	4.0		VoiceOver	Bose	3.4	3.9	3.2	3.1
		Delphi	3.7	3.9	2.5	3.5			Delphi	3.7	3.7	3.1	2.7
		JVC	3.5	3.5	4.4	4.4			JVC	3.3	3.8	3.1	2.8
		Onkyo	1.0	0.7	4.1	4.4			Onkyo	2.2	1.6	3.9	3.5
		Pioneer	3.5	3.5	2.9	3.8			Pioneer	3.5	3.2	3.2	2.9
		Tivoli	0.4	0.6	2.3	3.0			Tivoli	3.1	3.3	2.8	2.6
	VoiceOver	Bose	2.9	3.0	3.6	3.9							
		Delphi	3.8	3.3	3.8	4.2							
		JVC	3.8	3.2	3.8	4.2							
		Onkyo	1.5	0.5	3.7	4.2							
		Pioneer	3.7	3.3	3.7	4.2							
		Tivoli	0.4	0.5	2.7	3.1							

Appendix 3: Percentage of people leaving radio on by genre and scenario

			+0		+6					+0		+6	
			-20	-10	-20	-10				-20	-10	-20	-10
B to B	Music	Bose	0.83	0.83	0.83	0.78	Super B	Music	Bose			0.88	0.83
Short Space		Delphi	0.84	0.83	0.79	0.89	to B		Delphi			0.83	0.93
		JVC	0.88	0.90	0.73	0.56			JVC			0.95	0.90
		Onkyo	0.83	0.85	0.93	0.47			Onkyo			0.98	0.88
		Pioneer	0.88	0.88	0.88	0.58			Pioneer			0.93	0.95
		Tivoli	0.66	0.58	0.16	0.16			Tivoli			0.88	0.85
	Speech	Bose	0.66	0.40	0.50	0.44		Speech	Bose	0.73	0.48	0.95	0.90
		Delphi	0.63	0.44	0.39	0.70			Delphi	0.65	0.36	0.90	0.89
		JVC	0.79	0.69	0.54	0.11			JVC	0.76	0.14	0.95	0.90
		Onkyo	0.83	0.85	0.94	0.04			Onkyo	0.74	0.30	0.94	0.90
		Pioneer	0.80	0.83	0.53	0.15			Pioneer	0.78	0.11	0.95	0.84
		Tivoli	0.16	0.20	0.01	0.01			Tivoli	0.63	0.18	0.94	0.90
	VoiceOver	Bose	0.88	0.84	0.83	0.80		VoiceOver	Bose	0.80	0.80	0.89	0.98
		Delphi	0.91	0.81	0.75	0.95			Delphi	0.65	0.66	0.84	0.93
		JVC	0.93	0.81	0.70	0.36			JVC	0.78	0.48	0.88	0.99
		Onkyo	0.84	0.83	0.94	0.13			Onkyo	0.85	0.75	0.89	0.98
		Pioneer	0.90	0.89	0.74	0.29			Pioneer	0.68	0.36	0.88	0.96
		Tivoli	0.38	0.53	0.01	0.01			Tivoli	0.78	0.37	0.88	0.98
B to B	Music	Bose	0.95	0.83	0.76	0.66	Super B	Music	Bose	0.90	0.92	0.65	0.60
		Delphi	0.98	0.95	0.88	0.82	to Super B		Delphi	0.91	0.88	0.58	0.65
		JVC	0.98	0.94	0.87	0.80			JVC	0.89	0.72	0.61	0.56
		Onkyo	0.07	0.03	0.85	0.80			Onkyo	0.80	0.36	0.61	0.56
		Pioneer	0.98	0.92	0.84	0.75			Pioneer	0.88	0.73	0.65	0.55
		Tivoli	0.02	0.03	0.28	0.25			Tivoli	0.84	0.59	0.60	0.48
	Speech	Bose	0.70	0.75	0.50	0.85		VoiceOver	Bose	0.75	0.95	0.69	0.61
		Delphi	0.94	0.95	0.43	0.85			Delphi	0.85	0.93	0.61	0.51
		JVC	0.89	0.91	0.93	0.93			JVC	0.73	0.80	0.63	0.56
		Onkyo	0.04	0.03	0.83	0.95			Onkyo	0.45	0.15	0.89	0.75
		Pioneer	0.94	0.91	0.53	0.85			Pioneer	0.85	0.83	0.69	0.55
		Tivoli	0.01	0.05	0.28	0.58			Tivoli	0.65	0.73	0.54	0.45
	VoiceOver	Bose	0.65	0.71	0.86	0.86							
		Delphi	0.96	0.80	0.90	0.90							
		JVC	0.91	0.88	0.83	0.91							
		Onkyo	0.13	0.01	0.84	0.91							
		Pioneer	0.90	0.86	0.83	0.95							
		Tivoli	0.03	0.03	0.51	0.54							